their various opinions. The chapter on the Chaldæan civilisation is interesting, and is full of curious information. The volume is concluded by an appendix treating of the Pharaohs of the Ancient and Middle Empires, and by a useful index. M. Maspero is fortunate in having found so careful a translator as Mrs. McClure, who introduces her work in a preface which is at once business-like and to the point. The editor's remarks are, however, somewhat rambling, and in professing to criticise M. Maspero's knowledge of matters Egyptian or Babylonian, we think greatly out of place.

THE TRANSMISSION OF POWER.

On the Development and Transmission of Power. By William Cawthorne Unwin, F.R.S. (London: Longmans, Green, and Co., 1894.)

IT is well known that the author of this work has had special opportunities for studying the subject of transmission of power by all the various methods which have, at different times, been adopted, and the engineering world is to be congratulated on having received from his pen a summary of the principles utilised in this class of work, and of the possibilities of the future, as well as very complete and authentic information about the principal work that has been done in the past. This book is the outcome of a course of "Howard" lectures delivered before the Society of Arts in 1893. It deals with the generation, storage, and transmission or distribution of power. The methods of transmission and distribution include water under pressure, compressed air, wire ropes, steam, gas and electricity. The author recognises the fact that transmission of power to distances has not been so fully developed in the past as it is likely to be shortly, and that the electrical transmission and distribution of power has more to claim in the way of promises for the future than large achievements in the past.

The first chapters deal with the generation and the cost of generating power by steam or hydraulically. One of the most valuable parts of the book is found in those chapters where the economy of steam engines is considered. These chapters deal with the losses in boiler and engine in a very complete manner. The author has realised very fully the fact that in any case of generating power in large quantities, and distributing it to small consumers, the cost of the horse power depends largely upon the load curves at different times of the day, and he draws attention to the very large excess of cost per horse power of electric lighting stations over those which are delivering power at a constant rate. Even in a pumping station where the work is continuous, he finds that about 35 per cent. more fuel is required than in a careful trial, but in a station from which electric light or power is distributed, the losses due to banking of boilers and to engines working a portion of their time at an output which is not economical, are such that the quantity of fuel used per indicated horse power rises from 1½ lbs. per hour in a test trial with a condensing engine, to 3·3 lbs. under the special circumstances. The relative advantages of the condensing and non-condensing engines of the simple, compound, and triple expansion engines, of the steam-jacketing and superheating, are all discussed admirably. Some pages also are devoted to the utilisation of house refuse as a fuel, and the Halpin system of thermal storage receives some attention.

Some of the most important cases of utilising water power are also discussed. It will surprise many readers to find that even in 1876, 70,000-horse power was generated for manufacturing purposes from waterfalls in Switzerland, and that in the United States in 1880, 36 per cent. of the power used in manufacturing was water power, and only 64 per cent. steam power.

Among the chapters devoted to transmission of power, the most important, as pertaining more especially to the author's experience, are those on hydraulic and compressed air transmission. But in all branches of the subject, not only are the general principles dealt with, but there is to a pretty full extent a recapitulation of what has already been done. The London Hydraulic Power Company is taken as the best example of hydraulic transmission, but Liverpool, Birmingham and Manchester are also referred to, whilst most interesting accounts of the hydraulic supply at Zurich and Geneva are given. The principles of pneumatic distribution are very completely described, and the author has certainly made out the case that when these principles are properly applied, this system of distribution deserves more consideration than is generally accorded to it. Naturally the Paris distribution by this method is dealt with very fully, but other examples of interest are added. With regard to the distribution of power by steam, the most important case is that of New York, which Dr. Emery started in 1881. Eight pages upon gas distribution for power purposes are well worth some study, whether with regard to manufactured gas, or the natural gas supply in Pennsylvania. Whilst compressed air receives the author's attention to the extent of forty-eight pages, electrical distribution is by no means so well favoured; but the author explains that, in the first place, it is not his own speciality, and, in the second place, there are at the present moment few cases of electrical transmission combined with a complete system of distribution in a town. A chapter is at the end devoted to the great work which is now approaching its full development at Niagara Falls.

This short review cannot pretend to give an adequate idea of the contents or value of Prof. Unwin's book. Regarding the merits of the work generally, it is sufficient to say, first, that throughout it is written with the utmost fairness and impartiality; and secondly, that if any engineer were planning a system of transmission and distribution of power in any special case, he would be labouring under very considerable disadvantages if he had not first consulted this latest and most complete work on the development and transmission of power. G. F.

OUR BOOK SHELF.

A Treatise on Hygiene and Public Health. By Thomas Stevenson, M.D., F.R.C.P., and Shirley F. Murphy. (London: J. and A. Churchill, 1894.)

THIS volume is devoted to the subject of sanitary law, and it well maintains the all-round excellence of the two volumes that preceded it. Health officers will welcome the appearance of such a lucid and comprehensive digest of the law relating to the public health in England and Wales, Ireland and Scotland.

During comparatively recent years an immense amount

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of piece-meal legislation bearing upon the public health has been passed; that much of this legislation, despite subsequent amendments, still remains obscure and unsatisfactory is clearly shown in the results of proceedings undertaken by those whose duty it is to put it in force. What cause to wonder, then, if the lay reader, by reason of obscurities in the particular Act itself, or from the fact that either amendments have been introduced by succeeding enactments or the particular Act is itself an amendment of earlier statutes, becomes bewildered, and a laudable desire to master an important subject is nipped in the bud? Those who are concerned in the administration of this branch of the law have frequent occasions to regret the lamentable ignorance existing among all sections of the community as to their powers and liabilities in matters which may seriously affect their vital interests. Any simplification and consolidation, therefore, more especially when it is undertaken, as in this instance, by gentlemen of recognised legal ability, should prove very welcome not only to health officers, but also to the general public.

The decisions of the authors of the work to collate the various provisions contained in different enactments dealing with the same subject, and to present these—so far as possible—freed of all legal phraseology, was a happy one; it makes the work unique in its serviceability to the lay reader, who will gain from its perusal a clearer and more definite knowledge of the public health laws of the different parts of the United Kingdom than he would succeed in doing—at a much greater sacrifice of time and patience—from any other publication dealing with the same subject.

Involution and Evolution according to the Philosophy of Cycles. By Kalpa. (London: Eyre and Spottiswoode, 1894.)

THIS is one of the books that most people would be glad to lay aside, and, indeed, it is very difficult to say with what object it has been written. The cycles decribed have nothing to do with approximate commensurability of planetary motions, and certainly not with evolution as understood in the modern acceptation of the term. The author is a disciple of the school of Mdme. Blavatsky, and draws his inspiration from that source, tinged, it may be, with something of esoteric Buddhism, and a good deal "spider-wove from his own brain." If anyone wants to know what absurdities modern theosophy is capable of, by all means let him read it, but most people will be satisfied to take the contents at second-hand. A very objectionable feature in the book is the occasional quotation at the heads of chapters of extracts from recognised writers of authority, conveying the impression that the contents of the chapters following are based upon modern science, and would meet the approval of the authors from whom the quotations are made. One illustration will be sufficient to show the style of the author's reasoning and the character of the information conveyed. The particular object is to demonstrate the birth of comets and worlds (p. 148). "But the least subtilised type of those disembodied groups does not take the same direction as the others. It keeps going in orbits round the sun, shooting beams at him, which, expelled (seemingly, at least), spread out behind as a lengthy tail. Then, when the sun takes a short rest, his brilliancy nearly spent, that entity moves off, its beams showing the way, but greatly reduced, and of which nought remains ere the *comet* disappears for parts unknown. It will be known to us as comet I." We have, approximately, 200 pages of this sort of stuff, paragraph after paragraph, all of which are utterly incomprehensible, and to wind up the whole we have sheet after sheet of diagrams or illustrations which no man can understand, and on which we should imagine the author himself would pass a very doubtful examination.

The Mountains of California. By John Muir. Pp. 381. (London: T. Fisher Unwin, 1894.)

FEW regions offer more remarkable subjects for the student of nature than the State of California. There are the two great mountain ranges—the Coast Range on the west, and the Sierra Nevada on the east. Great cañons furrow the latter to depths of from two thousand to five thousand feet, and in the middle of the deepest of them flourish the Sequoia, the noble sugar and yellow pines, Douglas spruce, Libocedrus, and the silver firs, each a giant of its kind. Floods of lava cover the north half of the High Sierra, and volcanic craters, recent and in all stages of decay, are dotted over it. Mount Shasta is one of these volcanic cones, rising to a height of more than fourteen thousand feet above sea-level. Deep grooves flute the sides of the mountains, and testify to glacial erosion. It appears that so far south as latitude thirty-six degrees, traces of glacial action abound. Mr. Muir has found sixty-five residual glaciers in the portion of the Sierra lying between latitudes thirty-six and thirty-nine degrees. The first one of these was discovered by him in 1871 between two of the peaks of the Merced group. He also determined the rate of motion of the middle of the Maclure glacier, near Mount Lyell, to be but little more than an inch a day. Mount Shasta has three glaciers; while Mount Whitney, though the highest mountain in the range, has none.

The special features of the volume are the descriptions of the glaciers, glacier lakes, and glacier meadows in the Californian mountains, and the interesting account of the grand forest-trees of the Sierra.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Origin of Classes among the "Parasol" Ants.

MR. J. H. HART is Superintendent of the Royal Botanic Gardens in Trinidad. He has sent me a copy of his report presented to the Legislative Council in March 1893, and has drawn my attention to certain facts contained in it concerning the "Parasol" ants—the leaf-cutting ants which feed on the fungi developed in masses of the cut leaves carried to their nests. Both Mr. Bates and Mr. Belt described these ants; but described, it seems, different, though nearly allied, species, the habits of which are partially unlike. As they are garden-pests, Mr. Hart was led to examine into the development and social arrangements of these ants; establishing, to that end, artificial nests, after the manner adopted by Sir John Lubbock. Several of the facts set down have an important bearing on a question now under discussion. The following extracts, in which they are named, I abridge by omitting passages not relevant to the issue:—

"The history of my nests is as follows: Numbers one and two were both taken (August 9) on the same day, while destroying nests in the Gardens, and were portions of separate nests but of the same species. No. 3 was procured on September 5, and is evidently a different although an allied species to Nos. 1 and 2.

"Finding neither of my nests had a queen, I procured one from another nest about to be destroyed, and placed it with No. 1 nest. It was received by the workers, and at once attended by a numerous retinue in royal style. On August 30 I removed the queen from No. 1 and placed it with No. 2, when it was again received in a most loyal manner. . . .

"Ants taken from Nos. 1 and 2 and placed with No. 3 were immediately destroyed by the latter, and even the soldiers of No. 3, as well as workers or nurses, were destroyed when placed with Nos. 1 and 2.

"In nest No. 2, from which I removed the queen on August 30, there are now in the pupa stage several queens and several

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